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STANFORD LINEAR ACCELERATOR CENTER

TEN YEAR SITE PLAN

FY 2007 – FY 2016

June 3, 2005

TEN YEAR SITE PLAN
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I. Executive Summary

This Ten Year Site Plan envisions the Stanford Linear Accelerator Center contribution to DOE's Strategic Plan, Office of Science Strategic Plan and SC's long range science facility plan. The plan takes a corporate, holistic and performance-based approach to real property life cycle asset management that links facility and infrastructure planning, budgeting, implementation and evaluation to science program missions.

SLAC site development is driven by the scientific missions under the Office of Science programs in Basic Energy Sciences (BES), High Energy Physics (HEP), Biological and Environmental Research (BER), and Advanced Scientific Computing Research (ASCR). Over the planning period, BES will have the most significant impact, with the construction of the Linac Coherent Light Source (LCLS), the world's first free electron laser. The current projection assumes three LCLS facility projects, the largest being a major expansion of LCLS with multiple beam lines. The LCLS program will evolve and grow, driven by scientific achievement and user demand.

Driven by the new scientific imperatives, SLAC's research vision is evolving dramatically. Photon science is the most rapidly expanding element in the changing balance of scientific foci at SLAC and the BES program is becoming the dominant program. The PEP-II B-Factory program under HEP is expected to end its operations in 2008. In 2009, the BES-funded LCLS and SPEAR3 will be the primary experimental programs at SLAC. The SLAC linear accelerator (Linac) currently serving as the injector for PEP-II and other experimental programs, will be used as the injector for LCLS. Since the inception of SLAC, the funding for the operations of the Linac has been the responsibility of HEP. Beginning in FY2006, funding to partially support the Linac is expected to come from BES. This will mark the beginning of a 3-4 year transition of programmatic ownership of the SLAC Linac operations from HEP to BES as the LCLS project proceeds.

To prepare this TYSP, SLAC formulated its FY2006 Integrated Facilities and Infrastructure Budget and then extended it through FY2016. The plan encompasses all line item construction, general plant projects, third party financed construction, Science Laboratory Infrastructure, and environmental restoration/remediation activities. It also identifies direct and indirect funding for infrastructure and maintenance of real property.

In accordance with SC guidance, this plan assumes level funding for FY2007 – FY2011, except for the BES budget, which shows significant growth associated with the LCLS program. In addition, the environmental management activities, for which DOE has yet to decide on the long term program funding source for environmental remediation projects, do not assume level-budget planning.

Third party financing either has been obtained or will be pursued for new construction totaling about 137,000 square feet and an estimated cost of $78 million. Potential funding sources include Stanford University and other Federal agencies. Although DOE funding for these projects is not currently requested, they are included in SLAC's Summary of Resource Needs because they will have a major role in supporting the Laboratory's research vision.

SLAC has analyzed its real property for condition, function, mission impact, safety, environmental protection, and property preservation to determine an acceptable funding level for sustainment and modernization. Assuming full funding for budgeted and proposed SLI, GPP and direct and indirect maintenance and repair work, SLAC will significantly reduce its deferred

maintenance backlog, upgrade substandard facilities and keep its conventional real property assets in an adequate or better condition to meet mission requirements.

SLAC's primary infrastructure challenges include maintaining old facilities, replacing temporary structures with permanent buildings, increasing the Laboratory operating budget directed toward infrastructure, and identifying the funding source for environmental restoration/remediation work not currently funded by the EM program. These challenges and the strategies for meeting them are discussed in this plan. If the plan is successful, mission needs will continue to be met.

II. Site Summary

The Stanford Linear Accelerator Center is a Department of Energy user facility that serves as a national resource in basic science, research and engineering. SLAC is managed and operated by Stanford University, and is located near the foothills on the San Francisco Peninsula about three miles west of the University campus in an unincorporated portion of San Mateo County. The site occupies 426 acres of land owned by Stanford University that was leased in 1962 to the Atomic Energy Commission, through the year 2012 at no fee. This plan assumes that a new long term lease will be negotiated by DOE and Stanford University.

Operations began in 1966 with the two-mile long accelerator directing electrons into stationary targets in experimental halls End Station A and End Station B. In 1972 SPEAR, then the world's most powerful electron-positron colliding beam device, began operations. In 1980 a new electron-positron beam machine called PEP, a storage ring about 800 meters in diameter operating off the Linac, began operations. The SLAC Linear Collider (SLC), an electron-positron collider slightly larger in size than PEP that also operated off the Linac, was completed in 1989. PEP-II, an upgrade of the original PEP machine, was completed in 1998 and provides beam to the BaBar detector. The Stanford Synchrotron Radiation Laboratory (SSRL) was established in 1973 and until 1990, shared SPEAR with the high energy physics program at SLAC. SPEAR became a fully dedicated light source in 1990, and SSRL became a division of SLAC in 1992. The original SPEAR ring was upgraded to operate as a third generation light source, SPEAR 3, in 2004.

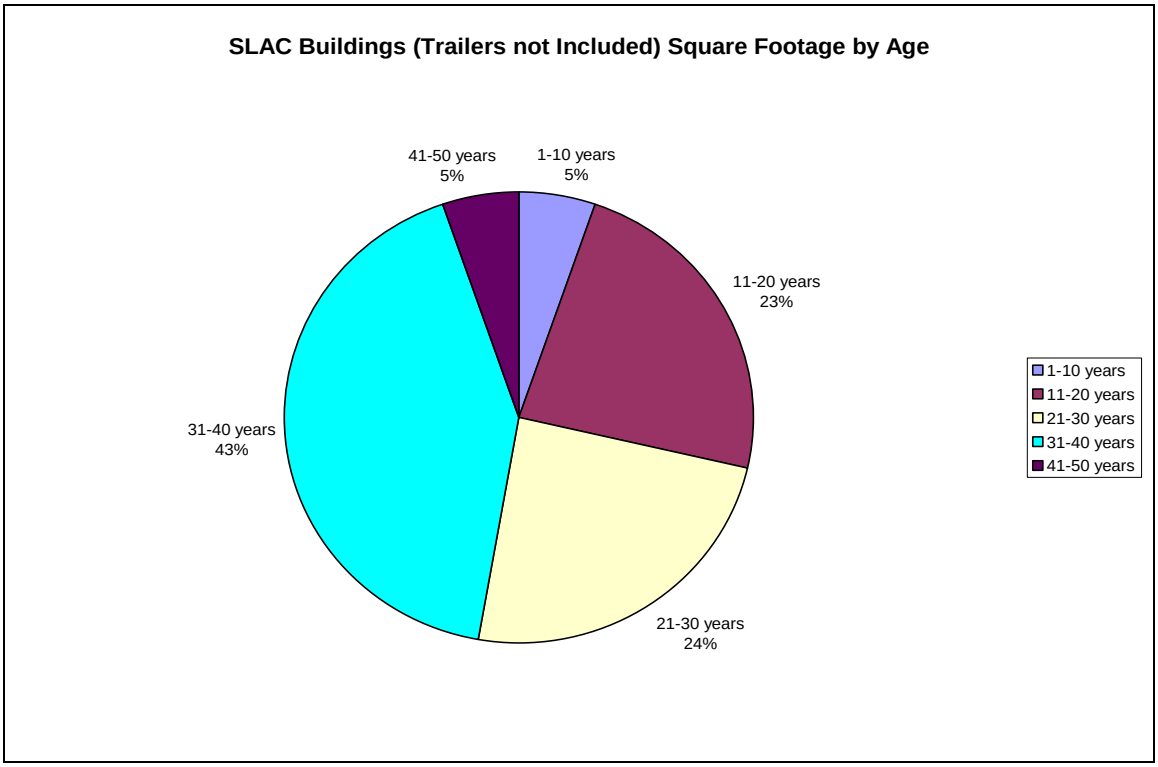
SLAC's physical plant consists of 112 buildings and structures and 39 real property trailers totaling nearly 1.8 million square feet, as well as site utilities and roadways. Total replacement plant value (RPV) is recorded as $859 million in FIMS. The physical plant includes many tunnels and other unique experimental facilities, the largest of which are the two-mile long Klystron Gallery (356,000 square feet) for the linear accelerator and the Linac accelerator housing (115,000 square feet). Except for the newly constructed on-site Guest House, owned by Stanford University, all SLAC facilities are owned by DOE. SLAC has no excess facilities.

An aerial view of the SLAC site is provided as Appendix I. Additional site information, including building photographs, maps and public information can be accessed at http://www.slac.stanford.edu/.

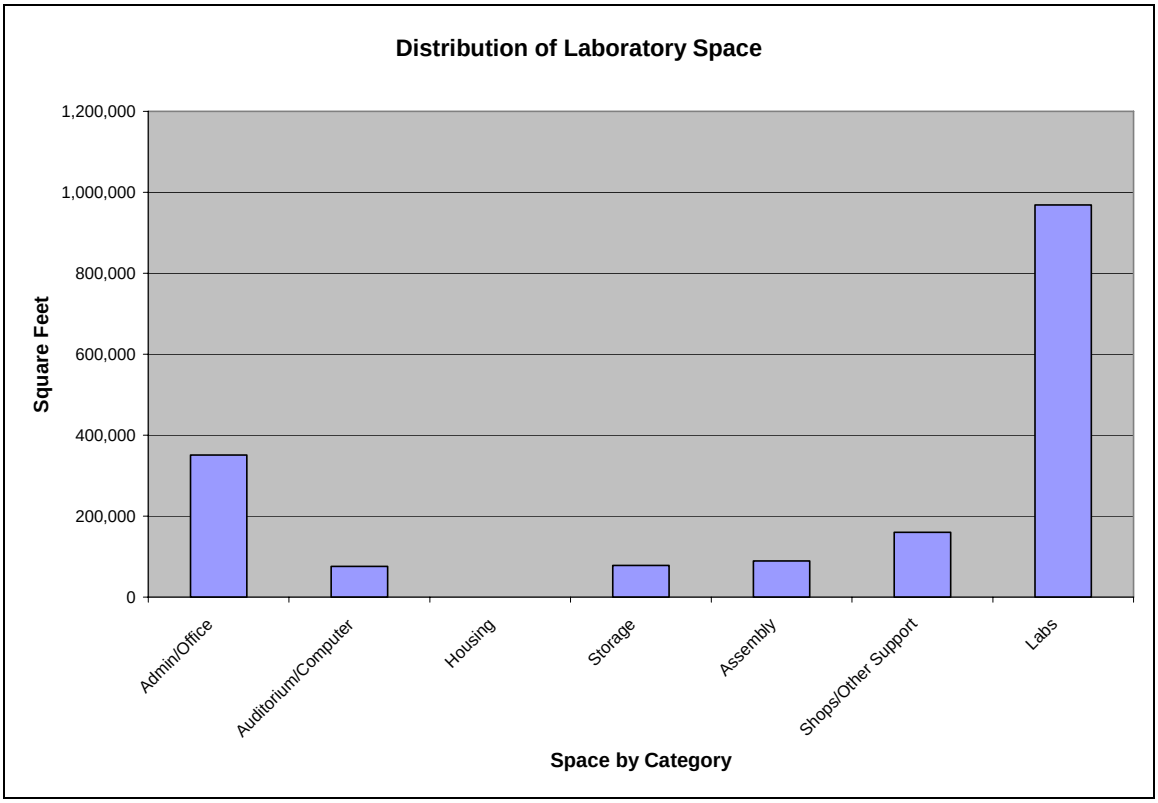
The current full and part-time staff is approximately 1,520. Annually, the Laboratory hosts over 3,000 scientists for research utilizing synchrotron radiation and in particle and astroparticle physics. The estimated average daily site population is about 2,400, including staff, subcontractors, users and visitors.

SLAC's total budget in FY2005 is $267 million, which includes $52 million for two line item construction projects.

Most of the Laboratory's infrastructure dates back to the original construction between 1962 and 1966. The following graph illustrates that 72% of the Laboratory's building space is over 20 years old, and 48% is over 30 years old.



The following chart illustrates the distribution of SLAC space, by GSA Use Code. (Note: The SLAC Guest House is owned and operated by Stanford University and therefore, the square footage is not included.)



See Appendix II for a summary overview of SLAC facilities. This summary shows total building space, RPV, maintenance investment, deferred maintenance backlog, and average building age, condition and utilization.

III. Mission

A. SLAC Mission Statement

SLAC's mission is to:

- Make discoveries in photon science at the frontiers of the ultra-small and ultra-fast in a wide spectrum of physical and life sciences.
- Make discoveries in particle and astroparticle physics to redefine humanity's understanding of what the universe is made of and the forces that control it.
- Operate a safe laboratory that employs and trains the best and brightest, helping to ensure the future economic strength and security of the nation.

B. Strategic Plan for Science and Technology

The Stanford Linear Accelerator Center is the lead Department of Energy laboratory for electron-based high energy physics. It is dedicated to research in elementary particle physics, particle

astrophysics, accelerator physics, and to fields that can make use of its synchrotron radiation facilities - including biology, chemistry, geology, materials science and environmental engineering. SLAC is a national user facility serving universities, industry and other research institutions throughout the world.

In 2009 when LCLS begins operations, it will provide unique photon beams for research exploring previously inaccessible realms of structural dynamics in the chemical, biological and material sciences, as well as new applications in nanoscale phenomenology and atomic and plasma physics.

SLAC's strategic plan provides for research in the following areas:

- Synchrotron Radiation Sources (SPEAR 3)
- Sub-Picosecond Pulsed Source (SPPS)
- Linac Coherent Light Source (LCLS)
- Ultra-Fast Optical Science and Technology
- Advanced Wiggler and Undulator Beam Lines
- PEP-II, Asymmetric B-Factory
- BaBar Detector
- Other Experiments Utilizing PEP-II
- Participation in Design and Engineering of International Electron-Positron Linear Collider (ILC)
- Particle Physics Potential for Linear Colliders
- Particle Astrophysics – GLAST (Gamma-Ray Large-Area Space Telescope) and other proposed projects such as LSST (Large Synoptic Survey Telescope)
- Advanced-Accelerator Research Facility with the capability of Ultra-Short Beam Pulses

Other Experiments Utilizing SLAC's Unique Core Competencies:

- High-Intensity, High-Brightness Electron Linear Accelerators and Storage Rings
- Advanced Accelerator Science and Technology
- High-Power Pulsed and Continuous-Wave Microwave Power Sources
- Fabrication and Support of Large-Scale Experimental Facilities
- Charged-Particle and X-Ray Optical Systems and Detectors
- Condensed Matter Physics and Structural Biology
- Coherent X-Ray Sources and Supporting Expertise
- Ultra-Short High-Brightness Pulsed Source
- Real-Time Computing
- High-Speed Computing and Networking
- Large Scale Data Management
- Advanced Electronics
- Large-Scale Ultrahigh Vacuum Systems
- Radiation Physics and Monitoring
- Polarized and High-Brightness Electron Sources
- Magnet Design and Measurement
- Control and Feedback Systems
- Support for Worldwide Collaborative Research and Experiments

C. Major Program Direction

SLAC's major program direction is centered on Photon Science and High Energy Physics/Particle Astrophysics.

Photon Science

Photon science is a very rapidly expanding program at SLAC. SPEAR3 has significant expansion capability for new beam lines. The first two new beam lines are under fabrication, one funded by DOE-BES and the other funded by Cal Tech with a gift from the Moore Foundation. Other new beam lines will be built by seeking funding from DOE as well as from third parties. The LCLS, a new BES initiative which will utilize the last one-third of the linear accelerator to build the world's first x-ray free electron laser, is currently in the design and long-lead procurement phase, and is scheduled to become operational in 2009. The science program of LCLS is expected to grow significantly and in recognition of this, the initial construction is being designed to accommodate substantial performance enhancements without significant reconstruction of conventional facilities. The infrastructure will readily accommodate future LCLS expansion of additional beam lines proposed in the horizon of this TYSP.

High Energy Physics

B-factory will continue operations through 2008. However, a surprising result that discovers evidence for new physics could lead to the demand for a Super B-Factory able to deliver data samples 100 times the capability of the current machines. The primary focus of the Laboratory's future accelerator based physics program is the Linear Collider. SLAC is committed to playing a major role in designing the International Linear Collider (ILC) and in participating in its eventual construction. In addition, the Laboratory will continue to thrive in new areas. There is the R&D effort, which could lead to a full-scale experiment to measure neutrinoless double beta decays through the Enriched Xenon Observatory (EXO). Effort will also be devoted toward the advanced accelerator R&D essential for future machines.

Particle Astrophysics

GLAST, SLAC's first major venture into particle astrophysics, has led to the founding of the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), a joint institute of Stanford University and SLAC. GLAST will begin its operation phase after the launch in 2007. Other projects such as the Large Synoptic Survey Telescope (LSST) and the Joint Dark Energy Mission (JDEM) that will dominate particle astrophysics in the next decade are currently in the R&D phase. Other new initiatives are anticipated towards the end of this decade that will lead to the next generation of cosmological studies.

Collaborations and Users

Over the last decade, the trend in high energy physics research has led to very large international collaborations cooperating on a single experiment. This has been illustrated by the BaBar experiment at SLAC, which consists of over 600 physicists from about 70 U.S. and international institutions. GLAST is another international collaboration currently underway, and others will undoubtedly follow during the planning period. A multi-lab international collaboration is currently being formed around the plan of designing and eventually building

an International Linear Collider. While the elements of this collaboration are still in a formative stage as this document is being written, SLAC will certainly play a major role in this enterprise and some of the future needs of the Laboratory will be affected by how the plan materializes.

The synchrotron radiation program has experienced rapidly increased demand by the user community for the use of the SSRL beam lines, and the recent completion of SPEAR3 will continue to increase SSRL's volume of users. When LCLS is completed, the number of users will further increase. The user population now exceeds 3,000 and is expected to significantly increase in the next decade.

Funding Sources

SLAC will continue to be primarily funded by the DOE Office of Science (BES, HEP, BER, ASCR, SLI, S&S). In the next few years, as the PEP-II/BaBar experimental operations complete in 2008 and the LCLS operations begin in 2009, there will be a multi-year transition of the programmatic ownership for SLAC Linac operations from HEP to BES. BES will become the dominant program providing funding to SLAC.

Multi-agency funding is evolving at SLAC. For example, SPEAR3 was the first joint DOE/NIH capital project, and GLAST is a joint DOE/NASA initiative. Third party financing through Stanford University was utilized to construct the Guest House, completed in 2003, and is in place for the construction of the Kavli building for KIPAC, to be completed in FY2006.

Third party funding will continue to be sought thereafter for other select facilities. Potential donors to Stanford University have expressed interest in contributing to the construction of research facilities which are synergistic to the DOE programs. This is currently being pursued in biological sciences utilizing the synchrotron radiation facility and core competencies at SLAC. Planned third party financed projects are summarized in Section VI.E.

Staffing and User Levels

Staffing, currently about 1,520, is expected to increase over the planning period, particularly in the areas associated with the LCLS and SPEAR3 programs. Two new beam lines are currently under construction at SPEAR3, which when operable will give the light source thirteen beam lines. SPEAR3 has the capability to easily add another seven beam lines for a total of twenty. LCLS will come on-line in 2009, and expansions proposed to LCLS during the period of this TYSP include a second undulator and several additional undulator beam lines in three additional tunnels. The extraordinary LCLS beams will lead to new research opportunities in the chemical, biological and materials sciences as well as new applications in allied fields. The proposed third party financed facilities such as the X-Ray Laboratory for Advanced Materials Science and the Bio-X facility will support the growth of both staff and users. As a rough estimate, staffing of the Laboratory may increase by as much as 20% by FY2015. Total user population is expected to grow from the current 3,000 as well, although the increases associated with the synchrotron radiation science programs will be somewhat offset by the expected conclusion of the B-Factory experimental operations.

D. Interface of Facilities and Mission

Planned facilities are sited in accordance with the Stanford Linear Accelerator Center Long Range Development Plan (LRDP). The location and capacity of the site utilities, the need for other infrastructure requirements, and environmental issues were all evaluated on a conceptual level during the planning process for the LRDP. These issues, including the provision for utility services, were considered and accommodated in the cost estimates for each new construction project included in this plan.

SLAC's real property assets will be reclassified as mission-critical, mission dependent, or not mission dependent and the results submitted to DOE and entered into FIMS soon after SC guidance for implementing these revisions becomes available.

IV. Land Use Plans

SLAC completed its latest master land use plan, Stanford Linear Accelerator Center Long Range Development Plan, in December 2002 and updated it in June 2003. The new plan maintains and reinforces the framework of the General Development Plan (1961) and the Master Plan (1966). This Ten Year Site Plan is consistent with these long range plans.

The LRDP includes a 10-Year Plan that identifies facilities needed to support near term mission objectives, and a 20+ Year Plan that creates a framework for long term growth. The plan also preserves the buffer zones at SLAC boundaries that are important to the community at large, and encourages redevelopment and infill which minimizes expansion into undeveloped areas in order to minimize environmental impact.

For the most part, SLAC has grown within the planning framework of the original Master Plan. However, over the years many small support and storage buildings and more parking demand have crowded the core research areas. The LRDP employs strategies to make room for growth: redevelopment of low-density areas at higher density, expansion and intensification of existing facilities, and careful consideration of expansion into undeveloped areas.

The LRDP encourages the replacement of small, outdated structures with more efficient and well-planned development. The organizing principles of the original Master Plan will be restored and reinforced. The logic of well-planned development will make room for research program expansion and the human support systems (offices, parking, food service, short-term lodging, and computer facilities) necessary to serve those programs.

Another land use challenge is removal of recyclable scrap metal, which continues to accumulate as a result of DOE's suspension of recycling of surveyed and cleared metals from Radiological Areas. This requires considerable storage space and incurs considerable expense. SLAC costs are increasing as new storage locations are required and additional storage containers are acquired to protect these metals from the environment. The alternative to storage is even more costly low-level radioactive waste disposal, even though these materials have passed required screening criteria for no detectable radioactive contamination.

SLAC's LRDP serves as a working document and a guide for future development. The plan will be updated as necessary to meet the needs and goals of the Laboratory and its stakeholders. The URL for SLAC's LRDP is http://www-group.slac.stanford.edu/bsd/SLAC_LRDP_final.pdf.

V. Facilities and Infrastructure

A. Strategic Facilities and Infrastructure Goals and Issues

SLAC facility and infrastructure strategic goals focus on mission, working environment, ES&H and O&M.

Mission: SLAC's facilities and infrastructure will be adequate to accommodate its expected programmatic mission activities and technological changes well into the 21st century.

Working Environment: The Laboratory will achieve a quality of facilities setting that provides a "preferred" working environment for employees and research users that helps attract and retain high quality staff. The Laboratory will employ the latest advances in information technology to enhance worker productivity. Users will have access to quality research support facilities and convenient and reasonable accommodations.

Environment, Safety, Health and Security: The Laboratory's facilities and infrastructure will provide a safe and healthy working environment for employees and visitors. Environmental cleanup will be completed. The Laboratory will continue to be viewed as a good neighbor to the community.

Operations and Maintenance: Facilities and infrastructure will be efficient to operate and maintain.

SLAC's primary facility and infrastructure issues include aging facilities and the funding needed to sustain and modernize them.

Aging Infrastructure: SLAC's infrastructure requires sustainment, seismic remediation and modernization. Most of the underground utilities were installed during the original site construction in 1962-1966. The "Safety and Operational Reliability Improvements" Science Laboratory Infrastructure (SLI) project, which will provide $15.6 million from FY2004 through FY2007, will replace a significant portion of the underground mechanical utilities, and will also seismically upgrade several important research and infrastructure facilities. Another proposed SLI project, Electrical Distribution Upgrade, is needed to replace deteriorated, unreliable and in some cases obsolete electrical equipment in the Klystron Gallery.

SLAC's conventional facilities comprise 112 buildings and 39 real property trailers totaling nearly 1.8 million square feet of space. The buildings (excluding trailers) range in size from about 60 to 116,000 square feet. Forty eight percent of SLAC's conventional space in square feet is over 30 years old and well maintained, but will eventually require upgrading and modernization. With proper maintenance and renovation, the vast majority of this space can continue to serve the research mission.

Maintenance Funding: During the many years of flat operating budgets (declining in terms of purchasing power), the maintenance budget remained at a constant dollar level. Resources have been lacking to timely address all the necessary maintenance, so the highest priorities have been given to safety issues and to the portions of the infrastructure necessary to prevent operational interruptions due to failures. The Laboratory plans to substantially increase maintenance funding beginning in FY2006 and has incorporated this in the Field Budget

Request submitted to DOE. See Section V.M. Five-Year Sustainment Requirements for additional information.

Temporary Buildings: Thirty-nine trailers are included in the real property inventory. Trailer complexes have been and continue to be low-cost solutions to meet immediate needs for space due to increased staff and users, even though such buildings are typically energy inefficient and costly to maintain. The long-term strategy is to replace many of the trailers and modular buildings with new multi-story conventional buildings, provided that the financial resources are available.

Environmental Remediation Funding: It is currently anticipated that, beginning in FY2009, Environmental Management (EM) will no longer fund environmental restoration work. Transfer agreements have not yet been finalized with the Office of Science (SC) regarding these responsibilities. This TYSP identifies the needed environmental restoration activities but excludes the funding for these activities from the "level operating budget" planning assumption.

B. Condition Assessment Process

SLAC's Conventional and Experimental Facilities Department (CEF) conducts annual real property condition assessments. A third party subcontractor inspects approximately 20% of the building square footage each year. The first full cycle will be completed in 2005. Other structures and facilities, including utilities and roads are inspected by SLAC personnel and are not included in the subcontractor's work scope.

Inspectors perform a thorough visual, non-invasive field inspection of the conventional architectural, civil/structural, mechanical and electrical components/systems of each asset to identify maintenance and repair deficiencies. The inspection also determines if there is sufficient physical evidence to warrant complete replacement of the system. Deficiencies are ranked according to urgency, with life safety as the highest priority.

Field data are collected by building, and deficiencies are reported according to: primary structure, including foundation, column/exterior wall, floor, roof/flashing, and other structural components; secondary structure, including ceiling, interior wall/partition, floor covering, stairways, windows and doors; and service system, including cooling, heating, ventilating, electrical, fire suppression, elevators and other service systems .

An inspection report for each asset is prepared that includes a narrative summary, deficiency photographs, deficiency narrative, corrective actions, corrective costs and priority year for correction. The report contains a Multi-Year Maintenance and Repair Plan, unconstrained by available funding. A probability of failure ranking is provided, starting at low and topping out at "high+" which is defined as failure imminent. The report also lists needs to be addressed within one year due to safety or cost benefit.

The inspection report also includes an Annual Work Plan that identifies the deficiencies recommended for correction for the current and following years. The report includes an evaluation of trends in deficiency types and costs, condition indices, summary condition, facility age and building component. Lastly, the report includes a Life Cycle Analysis for Component Renewal, including optimal year for renewal.

The inspection subcontractor combines its experience with R.S. Means estimates, Engineering Performance Standards, and other estimating guides to develop cost estimates. Each year the subcontractor updates and escalates all estimates from previous years. At the end of FY2004, 20% of the building and trailer assets had not been inspected by the subcontractor. The deferred maintenance (DM) estimates for these yet to be inspected assets were based on the average DM per square foot of similar type buildings that had been inspected. By the end of FY2005, all building assets will have been inspected during the last five years and all estimates will be updated.

The formal facility assessment process forecasts all work required to maintain and repair the facilities for the following 10 years, unconstrained of available funding limitations. This provides a comprehensive baseline for prioritizing corrective actions and determining which deficiencies are to be recorded as deferred maintenance in FIMS.

The inspection subcontractor classifies all deficiencies in one of the following six categories: Safety, Investigative, Deficiency, Component Renewal, Cyclic Maintenance, and Energy Conservation. These categories are defined as follows:

Safety - items that need to be corrected immediately to prevent injury or accident. This would include items such as exposed wiring, a broken handrail or the replacement of a shaft guard.

Investigative - a special category for the segregation of items that need a more precise definition before the specific deficiency can be determined and the corrective action identified. Generally, it will include a specialized study.

Deficiency - those maintenance deficiencies that have been observed but not yet acted upon.

Component Replacement - the projected or expected replacement of a building system or system component (lighting system, roof system, boiler, chiller, etc.) as it reaches the end of its useful life through a physical evaluation and application of average expected life cycle analysis.

Cyclic Maintenance - a project or deficiency that recurs based on normal wear patterns. Typically, painting, caulking and carpet replacement are items that fall into this category.

Energy Conservation - measures taken specifically to conserve energy or replace a component with a new type, which will be more energy efficient. It might include the installation of an energy management conservation system, the installation of a new higher efficiency boiler, insulation installation or upgrade, or the installation of thermally efficient windows or doors.

All safety deficiencies are entered into the work order system for correction. During FY2004 and previous years the first three categories, Safety, Investigative and Deficiency, were used for identifying and reporting DM. These categories include the highest priorities for keeping assets in an acceptable condition. The remaining three deficiency categories are lower in priority and are not recorded in FIMS. These include Component Renewal, such as replacing a functioning hot water heater that has exceeded its expected life, Cyclic Maintenance, such as repainting on a prescribed schedule regardless of need, and Energy Conservation, such as replacing a functional component with one that is more efficient.

The deficiencies in categories Safety, Investigative and Deficiency are reviewed, and those items that are aesthetic or cosmetic, that is, not related to safety & the environment and judged to not have mission impact or result in property deterioration, are also not entered into FIMS as DM. However, those aesthetic and cosmetic items are evaluated and many are entered into the work order system for correction.

For the FY2005 DM report, categories Component Replacement, Cyclic Maintenance, and Energy Conservation will be reviewed for items that should be included in deferred maintenance.

See Section V.O, "Deferred Maintenance Reduction" for additional information, including SLAC's plan for improving its process for identifying, prioritizing, documenting and tracking maintenance, deferred maintenance and improvement projects.

C. Current Facility Condition

The condition of SLAC's utilities, structures and buildings is sufficient to support the Laboratory's mission. Overall asset condition for active facilities is rated as "Good," based on current FIMS data. However, challenges remain.

Although there has not yet been a direct impact on programs, the greatest concern is utility reliability, especially underground mechanical utilities that have been failing at an increasing rate. The "Safety and Operational Reliability Improvements" line item project, scheduled to begin construction in FY2005, will eliminate known failure points in these underground utilities.

Other high priority maintenance issues include equipment replacements (primarily HVAC), electrical upgrades and re-roofing. Many modular or temporary structures have minor water damage from roof leaks and around wall penetrations. Since repairs are expensive, these structures will be replaced with proposed new permanent office structures, as funding becomes available. Cosmetic issues, such as interior painting, that do not affect safety or other basic occupant requirements are given a lower priority.

Appendix III, Facilities and Infrastructure Condition Assessment, summarizes the condition of SLAC buildings, real property trailers and OSFs by Facility Condition Index (FCI) and Total Summary Condition Index (TSCI). This appendix shows that all summary asset categories are rated adequate or better. The asset category of buildings that are proposed for "waiver status," which include accelerator tunnels and other unique experimental facilities, is rated excellent. See Section V.M. "Five-Year Sustainment Requirements" for further information on waiver assets.

D. Facilities Management, Space Management & Utilization

Space is coordinated through the Space Manager who reports to the Director of Operations. The Space Manager is the chair of the SLAC Space Planning Advisory Committee that includes representatives from all divisions who provide recommendations regarding space. These recommendations are presented to the Directorate for their final approval. SLAC does not charge a space fee to individual programs for use of facilities, but utilizes both direct and indirect charges to fund maintenance. All buildings suitable for occupancy are fully utilized and no excess space is available.

E. Facilities Supporting Mission Activities

SLAC has recently reorganized into four divisions – Photon Science, Particle and Particle Astrophysics, LCLS Construction, and Operations. The Operations Division, which includes CEF, has broad responsibilities for operational support and R&D efforts central to both science divisions. The Laboratory Directorate makes the funding decisions for all proposed real property improvements and infrastructure projects.

HEP is currently the site landlord. The real property general maintenance and site infrastructure projects are funded under the Laboratory indirect budget. HEP and BES provide maintenance and GPP funding for the facilities dedicated to their respective programs. BER and NIH occasionally provide capital funding to support the structural molecular biology program.

Maintenance for real property is the responsibility of the recently created Conventional and Experimental Facilities Department. The general maintenance budget is set annually as part of the Laboratory budget process, with priorities based on ES&H considerations, mission impact and property condition.

The narrative of this TYSP addresses SLAC's facilities as a whole. The TYSP Summary of Resource Needs for Facilities and Infrastructure (Appendix IV) breaks down requirements by funding source.

F. Site Utility Systems

Electrical Distribution System

The electrical distribution system consists of the 230kV transmission lines through the 100MVA master substation serving the 12kV distribution system and the various 12kV to 480V substations. Deferred maintenance currently stands at $3.09 million, and is comprised of $2.54 million for substations, $330 thousand for the 230kV transmission lines and $220 thousand for the 12kV distribution system. Although a full engineering review has not yet been conducted, SLAC proposes a $14.7 million SLI project "Electrical Distribution Upgrade" for FY2008-FY2010 that will reduce electrical distribution system deferred maintenance.

Cooling Towers

SLAC has six process and conventional system cooling towers with a combined capacity of 85MW. Deferred maintenance totals $38 thousand and addresses mechanical and structural component deficiencies within two of the towers. One of these towers is scheduled for replacement, due to seismic deficiencies, in the SLI project "Safety and Operational Reliability Improvements" currently approaching External Independent Review.

Compressed Air Distribution System

This system consists of approximately 14,000 feet of buried and above ground piping distributing compressed air site-wide. Deferred maintenance totals $110 thousand and consists of the leak repairs, receiver painting, and valve maintenance. A portion of this system will be upgraded in the SLI project "Safety and Operational Reliability Improvements" currently approaching External Independent Review.

Natural Gas Distribution System

This system consists of steel and plastic piping, either direct buried or in utility tunnels, distributing natural gas site-wide. Deferred maintenance is estimated at $385 thousand and consists of leak repairs and valve maintenance. Sections of this system are planned to be replaced in the SLI project "Safety and Operational Reliability Improvements" currently approaching External Independent Review.

Water Distribution System

This system consists of piping, direct buried and in utility tunnels, distributing fire water and domestic water site-wide. Deferred maintenance, estimated at $165 thousand, includes the repair of known leaks and valve maintenance. A portion of this system is planned to be upgraded in the SLI project "Safety and Operational Reliability Improvements" currently approaching External Independent Review.

Sewer System

This utility consists of the buried gravity and pressure piping system, including the lift stations, transferring sewage to the off-site public utility connection points. Deferred maintenance, estimated at $1.2 million, involves the repair of known leaks, replacement and upgrading of the lift stations, and removal of tree roots. A portion of this system is planned to be upgraded in the SLI project "Safety and Operational Reliability Improvements" currently approaching External Independent Review.

Fire Alarm System

The fire alarm system consists of the cable plant and central and remote stations connecting alarmed buildings site-wide. Deferred maintenance, estimated at $385 thousand, includes repair/upgrade of cable plant and software maintenance. This system will be upgraded in FY2005 as the present central station hardware will be obsolete in less than two years.

G. Leasing

The SLAC site is owned by Stanford University and is leased to DOE through 2012 at no fee. Since the TYSP extends through FY2016, the plan assumes that another lease will be negotiated.

H. Disposition and Long Term Stewardship

Based on the current programmatic assumptions, no buildings or structures are expected to be excessed during the planning period through 2016. However, there are contaminated facilities as identified in SLAC's Active Facilities Data Collection System (AFDCS) that would require remediation.

The SLC Arcs have been on "Operational Standby" since 1998 but, similar to the PEP Ring before PEP-II, are expected to be utilized in the future.

I. Program Maintenance

SLAC's programmatic personal property currently includes the beam lines within the two mile linear accelerator, the PEP-II Ring and SPEAR3, the BaBar Detector, other beam lines that support smaller experiments and accelerator research projects, and the complex RF and control systems that accelerate the electrons and positrons and control the experiments.

Maintenance of programmatic equipment is decentralized. Most of the programmatic equipment is unique and is typically maintained by distinct departments of engineers and technicians who are also responsible for the day-to-day operation of that equipment. In many cases, those professionals designed, built and installed the equipment and are responsible for frequent design upgrades required to meet new program requirements. They are intimately familiar with their equipment and have, over time, developed their own independent maintenance identification and tracking systems. This system has proven to be reliable and very cost effective, as demonstrated by the fact that most of the programmatic equipment not replaced because of obsolescence is still in operation.

J. EM Facilities

The primary environmental management issue at SLAC is control and remediation of legacy materials in soil or groundwater.

Since the early 1990's, the DOE Office of Environmental Management (EM) has funded the investigation and remediation of soil and groundwater at SLAC. The primary soil concerns are polychlorinated biphenyls (PCBs) and lead. The EM program has completed a number of soil remediations over the last 12 years, and is scheduled to complete additional work. The primary chemicals of concern in limited areas of groundwater at SLAC are chlorinated solvents. One groundwater remediation system has been in operation since 2001, and two more are planned for the next several years. In addition, a monitoring network and database have been established to monitor chemical movement in groundwater.

EM is currently working with SC on plans to transfer the responsibility for "Long-Term Response and Stewardship" activities at SLAC possibly beginning in FY2009. The remediation activities no longer funded by EM would include at least the operation and maintenance (O&M) of the groundwater containment and treatment system at the Former Solvent Underground Storage Tank Area (FSUST), and the O&M of two dual-phase extraction and treatment systems, one to be located at the Former Hazardous Waste Storage Area (FHWSA) and one to be located at the Plating Shop (PS) Area. EM and SC are negotiating transfer agreements, including program responsibilities.

There are additional SLAC sites identified as requiring environmental cleanup which were either removed from the EM work scope due to funding cuts or never added to the EM Baseline. In FY2004, an Independent Review Team (IRT) was convened to determine the appropriate scope and schedule for this remaining cleanup work. The IRT report recommended a split in responsibility between SC and EM. SLAC has prepared gross estimates to complete the additional scope, and EM and SC are negotiating a plan to accomplish this work. Additional scope agreed to by EM will require a baseline change requesting additional funds.

SLAC expects to receive EM funding of $2.48 million in FY2005 and $3.5 million in FY2006. SLAC is expecting EM to request funding amounts of $5.1 and $5.9 million for

FY2007 and FY2008, respectively. Appendix IV, Section 4.2.4 lists the projects that are either not currently funded by EM or are expected to be funded by EM through FY2008 and scheduled to be transferred from EM to SC in FY2009, pending agreement on a transfer plan. Section 4.2.5 lists O&M work associated with remediation not currently funded by EM.

K. Non-DOE Facilities

The SLAC Guest House is the only facility on the SLAC site that is neither owned nor managed by an SC program. This facility is owned and operated by Stanford University. The KIPAC building, to be completed in FY2006, will be another Stanford-owned building on the SLAC site.

L. Value Engineering

SLAC uses a combination of internal personnel and subcontractors to perform value engineering for facility projects. In-house staff usually provides value engineering for smaller projects, generally less than $1 million.

For capital projects with a total estimated cost (TEC) exceeding $1 million, the A&E subcontracts include a requirement for the architect or engineering firm to perform value engineering during the conceptual engineering phase. Capital projects with a TEC of less than $1 million and those projects funded with operating money are value engineered at regular SLAC project review meetings held from the conceptual to final design phases to establish design parameters consistent with required performance, safety, reliability, and quality criteria.

M. Five-Year Sustainment Requirements

SLAC's maintenance and repair (sustainment) budgets for FY2004 – FY2011 are summarized below. These budgets show substantial year to year increases. Budget detail is shown in Appendix IV, Section 5.0.

Fiscal Year	SLAC Budget Plan ($000)	SLI Deferred Maintenance Reduction Funding ($000)	Total Planned Maintenance ($000)
FY2004	(actual) 4,877		(actual) 4,877
FY2005	7,696		7,696
FY2006	8,198	125	8,323
FY2007	8,620	800	9,420
FY2008	8,808	1,400	10,208
FY2009	9,145	2,200	11,345
FY2010	9,618	2,800	12,418
FY2011	9,711		9,711

Maintenance and repair budgets are distinct from cost plans, such as that tracked by the SC-31, Quarterly Maintenance Report. Annual budgets may include items that require more than the current year to complete, while cost plans apply to the current year.

SC's overall goal is a minimum sustainment investment of 2 percent of replacement plant value. This criterion works well for facilities that fit traditional building models. However, most of SLAC consists of very large and unconventional experimental facilities with high replacement values. For example, the facility housing the Linac is a two mile long concrete tunnel with an RPV of $87 million. These unique structures, which include accelerator tunnels, interaction halls and other heavy concrete structures, typically require less conventional maintenance and repair.

Applying this unmodified 2 percent criterion to SLAC facilities results in an indicated maintenance budget of about $17 million. This far exceeds the historical average budget and is twice the amount SLAC requires to keep its conventional facilities in adequate or better condition.

The Office of Science recognizes that it may not be appropriate to apply the 2 percent goal to facilities that have high RPV's and low maintenance requirements. SC is considering ways to accommodate these unique structures, at both SLAC and at other SC sites.

SLAC will implement the selected SC-wide approach when guidance is made available. In the meantime, SLAC proposes an interim approach for setting its maintenance target. Assets are classified as either waiver or non-waiver. Waiver assets include accelerator tunnels and other unique experimental facilities. The results are shown below.

Non-Waiver Asset RPV (Note 1)……$384,348,229
SC 2% MII Goal……$7,686,965
Waiver Asset RPV…….. $466,228,797
0.2% Maintenance Target……...$ 932,458

Total RPV and Maintenance Target….$850,577,026 $8,619,423

Note 1: Excludes OSF 3000 assets and Site Preparation Grading & Lands.

In summary, SLAC's interim approach points to total FY2006 and FY2007 maintenance targets of $8.6 million for each year. This correlates closely with the $8.2 million and $8.6 million maintenance budgets, shown Appendix IV, Section 5.0. Proposed SLI "Deferred Maintenance Reduction" funding is not included in the MII calculation. Waiver assets for SLAC's interim approach are shown in Appendix V.

N. Maintenance Program for Nuclear Facilities

SLAC does not have any nuclear facilities.

O. Deferred Maintenance Reduction

SLAC is preparing a "Maintenance Improvement Project" plan that includes among its goals: 1) Better capture data from existing, separate preventive maintenance programs, 2) Insure that deferred maintenance items are identified, addressed and recorded as complete on a timely basis, 3) Look strategically at maintenance costs (replacement vs. repair), 4) Better document maintenance activities (including cost) and 5) Formal method of prioritizing infrastructure projects that includes probability and severity of occurrence. This new process, along with the decision to review the condition assessment subcontractor's report categories of Component Replacement, Cyclic Maintenance, and Energy Conservation for items that

should be included in deferred maintenance, may result in an increase in deferred maintenance. The Maintenance Improvement Project is expected to be implemented in stages over the next year, so the full impact of the new process will not be felt until FY2006. The new process will also provide data for improved estimating of future DM levels.

Note that the reporting and facility condition conclusions in this report are based upon SLAC's current data in FIMS.

SLAC's FY2004 total deferred maintenance is $23.3 million, or 2.7 percent of the Laboratory's $859.3 million RPV for conventional real property. This is better than the 5 percent guideline considered acceptable by industry standards and "Good" on SC's Facility Condition Index.

Deferred maintenance is recorded in FIMS. Reductions are recorded manually since there is no automated link between completed maintenance work and FIMS. SLAC does not, at this time, apply a formal mission risk and probability of occurrence tool (such as Capital Asset Management Process prioritization) to prioritize maintenance according to likelihood of and severity of mission interruption, but uses an informal method based upon safety and impact on the environment, mission impact, and property deterioration. (See Section V.B. "Condition Assessment Process for more information").

Despite favorable indicators, SLAC's aging infrastructure requires attention. This applies especially to the Laboratory's underground mechanical utilities, roofs, HVAC and electrical distribution systems.

To address these high priority issues as well as additional sustainment requirements anticipated from future condition assessments, given the President's Budget, maintenance budgets will increase from $4.9 million in FY2004 to $8.2 million in FY2006. Further increases over the following five-year period will continue to address HVAC, roof and other concerns, while the current SLI project "Safety and Operational Reliability Improvements" will correct most underground utility issues. SLI funding for electrical distribution upgrades is proposed for FY2008-2010 will address many electrical concerns.

In accordance with SC guidance, SLAC has also included SLI funding for direct and indirect funded deferred maintenance reduction for FY2006–FY2010. SC direct funding ranges from $0.125 million in FY2006 to $2.8 million in FY2010. SLAC understands that this direct funding is dependant on actual congressional appropriations and SC allocations.

Appendix IV shows budget plans for reducing deferred maintenance. The largest reductions will take place with the completion of projects identified under Section 5, direct and indirect funding for maintenance and repair. Although not specifically segmented, additional deferred maintenance backlog will be eliminated by SLI projects under Section 1.2 and General Plant Projects under Section 2.2.

As the first cycle of condition assessments nears completion, SLAC's deferred maintenance has increased. For example, deferred maintenance increased from $14 million in FY2003 to $23 million in FY2004, mainly due to higher than expected deficiency findings in the Klystron Gallery and other large structures. These findings were then projected to the 20 percent of square footage not yet subject to formal condition assessment. Another reason for the sharp increase is application of a more accurate and significantly higher cost escalation factor than that previously used by SLAC.

Deferred maintenance trends are shown in Appendix II. SLAC's deferred maintenance is expected to stabilize in FY2006, when the first full cycle of condition assessments is completed and the second round has begun.

In summary, budgets through FY2011 and beyond are expected to significantly reduce SLAC's deferred maintenance backlog and keep facilities in a condition which meets both SC asset condition performance objectives and the Laboratory's mission requirements.

P. Recapitalization

SLAC recognizes that it must plan for modernizing facilities to support mission needs. Recapitalization is the estimated cost to rehabilitate, improve or modernize a conventional asset to support mission activities, excluding those costs already reported as FIMS Deferred Maintenance.

Rehabilitation and improvement projects are listed in Appendix VI. SLAC has not yet populated the RIC field in FIMS. This will require a crosswalk between RIC, GPP and SLI projects and the underlining FIMS assets.

Q. Performance Indicators and Measures

DOE's proposed FY2005 contract performance measures for facilities management are shown in Appendix VII. Since the TYSP is due early in DOE's performance evaluation cycle, the Stanford Site Office has not yet proposed FY2006 measures.

R. TYSP Development Process

This site plan is required by DOE 430.1B, Real Property Asset Management. It was prepared under SC guidance and is organized according to the prescribed format. The initial plan was submitted to DOE in December, 2004. This revision incorporates recent guidance changes and updates the Summary of Resource Needs with FY2004 – FY2016 budget data. The following process was used for developing the plan.

The SLAC Directorate appointed the Deputy Director to chair a Steering Committee to prepare the TYSP. The Committee was comprised of a representative of each of the six Laboratory divisions (the TYSP was prepared before the recent reorganization), the Chief Financial Officer, the Space Manager and a staff coordinator. Division representatives included the Deputy Associate Director of Research, Assistant Director of SSRL, Assistant Director of ES&H, Manager of Site Engineering and Maintenance (now Conventional and Experimental Facilities) Department and the LCLS Chief Engineer.

The division representatives conducted a detailed assessment of facility needs to support the program objectives identified by the Institutional Plan and the document "The Future of SLAC – A Short Synopsis of the Key Elements and the Opportunities and Challenges They Represent" prepared for the May 2004 SC On-Site Review.

Engineering and maintenance staff expanded facilities and infrastructure projects through FY2011 and estimated out-year requirements through FY2016. The project list includes infrastructure that is expected to require repair or replacement during the planning period, with the intent that it be suitable to support the research mission to and beyond FY2016.

ES&H identified environment and safety issues and environmental restoration/remediation projects and related efforts that are not included in EM's current baselines.

Each project is intended to 1) cure or eliminate deficiencies resulting from aging, inadequate design, current seismic criteria, and obsolescence of facilities, 2) replace inefficient or substandard structures, or 3) upgrade and modernize sound but outdated facilities and infrastructure, all in support of the mission.

The Committee then reviewed and prioritized the project list, applying the criteria of mission need, ES&H issues, coordination with other Laboratory activities, and the ability of the Laboratory to fund, staff and implement each project. Finally, the Directorate reviewed the proposed projects and approved those of highest priority for inclusion into the TYSP. The TYSP was then approved in its entirety by the Directorate and submitted to the Stanford Site Office (SSO) for review and transmission to the SC, Chief Operating Officer.

Appendix IV contains the entire list of Line Item, SLI, Third Party Financed, GPP, Environmental Restoration/Remediation and Maintenance/Repair projects for the FY2004-FY2016 period. Modernization projects are also included in the FY2012 – FY2016 planning period.

Best efforts were devoted to the cost estimates, commensurate with scope and target budget year. RS Means cost estimating manuals were used as the basis for estimating new construction, utilizing the rough cost per square foot method for similar generic facilities. Where applicable, RS Means, combined with the actual costs of similar SLAC projects was used. Cost and schedule estimates are more refined for near term and larger projects.

S. FIMS

SLAC follows its approved FIMS Quality Assurance Plan, and there are no known database inaccuracies. Based on SC guidance regarding OSF Category 3000 structures, major re-categorizations of buildings and OSF (non-category 3000) were made during the summer of 2004. There was no net change to total replacement plant value due to the re-categorizations.

Three new fields were added to FIMS in 2003: Rehabilitation and Improvement Cost (RIC), Modernization Planning Indicator (MPI) and Conventional Facility Indicator (CFI).

RIC reflects modernization costs for non-program assets other than maintenance/repair. SLAC identifies needs, budgets for and sustains its assets with maintenance and repair, SLI, general plant project and other funds. This has resulted in an overall facility condition of adequate or better. The RIC fields in FIMS have not yet been populated. SLAC recognizes that older facilities will eventually require major rehabilitation and has budgeted RIC, as shown in Appendix VI.

MPI places assets into one of three categories: replace with another facility, demolish without replacement or continue to operate. Proper categorization allows for more accurate calculation of performance indicators. SLAC has fully populated FIMS with MPI data.

CFI identifies the conventional percentage of RPV for a Category 3000 asset. It provides a means for separating the conventional and program components in a mixed asset. There is no current need at SLAC to apply the CFI as nearly all FIMS assets are 100 percent conventional.

VI. Summary of Infrastructure Resource Needs

This section identifies planning assumptions and summarizes resource needs.

A. Planning Assumptions

- Per SC guidance, planning is based on level budgets, except for BES-funded new construction and SLI-funded line-item construction for the initial five year period.

- Environmental remediation projects and operating and maintenance costs associated with remediated areas not funded by Environmental Management are not included in the level budgets assumption.

- In addition to maintenance and repair, funding is budgeted for rehabilitation and improvement of aging infrastructure during the FY2012 – FY2016 period.

B. Line Item Construction Projects

Following are summary descriptions of Capital Line Item Construction Projects. Budget and schedule detail is shown in Appendix IV, Sections 1.1 and 1.2.

Linac Coherent Light Source (BES)

The total estimated cost (TEC) of this project is $315 million, which includes $36 million for project engineering and design and $279 million for construction.

The Linac Coherent Light Source (LCLS) will be the world's first x-ray free electron laser. LCLS is currently in the detailed project engineering and design phase, with long-lead procurements scheduled for FY2005, construction beginning in FY2006 and operations commencing in 2009.

A new injector will be built to inject electrons into the final kilometer of the three kilometer Linac to accelerate electrons into the new LCLS facility. Minor modifications will be made to the Linac to serve the LCLS. Two new experimental buildings, the Near Hall and the Far Hall connected by a beam line tunnel, will be constructed. A 72,000 square foot Central Laboratory Office Building will be built to provide laboratory and office space for LCLS users and to serve as a center for basic research in x-ray physics and ultra-fast science.

The beam line tunnels, experimental halls, and service buildings add another 84,000 square feet for a total building area addition of 156,000 square feet. The new construction will be located in the Research Yard and the experimental area east of the Research Yard.

Construction of the LCLS facilities required a waiver of DOE requirements for eliminating excess space at SLAC before any new facilities could be built. SLAC did not have enough excess space to meet the one-for-one offset requirement. The Director, Office of Science, applied excess space at other DOE sites to meet this offset, and the Secretary of Energy granted a waiver to SLAC, dated March 24, 2005.

LCLS 2nd Undulator (Technical System Only) (BES)

The TEC of this expansion is estimated at $129 million.

The initial LCLS project was designed and constructed to accommodate two parallel undulator systems within a single undulator tunnel. The second undulator system allows the LCLS to build upon the initial LCLS investment and deliver a second FEL, providing additional scientific opportunities possibly at an even shorter wavelength. The second undulator system is foreseen to be constructed, installed and available for research in FY2014.

LCLS Future FELs (Technical Systems and Conventional Facilities) (BES)

This expansion project has a TEC of about $1.1 billion for full implementation of six undulators. If fully funded, completion could be expected by FY2017.

To support the anticipated long-term growth of the LCLS science program, the current LCLS machine design allows for additional undulator beam lines to be accommodated in three additional tunnels, two to the south and one to the north of the original tunnel. Each tunnel is currently estimated to be 14 feet wide and 2,500 feet long. The expansion of the LCLS can be phased.

Safety and Operational Reliability Improvements (SLI)

Funding for this project commenced in FY2004 and will continue through FY2007. The TEC is $15.6 million.

This project addresses the Laboratory's aging and deteriorated underground utility systems and many of the remaining seismic remediation issues identified in the 1998 report required by Executive Order 12941, "Seismic Safety of Existing Federally Owned or Leased Buildings." Most of the infrastructure at SLAC dates back to the original construction of the Laboratory between 1962 and 1966. After approximately 40 years, many of the original utility systems are reaching end-of-life and are becoming unreliable and very expensive to maintain. A number of systems fail to meet modern safety standards. Serious deficiencies in the underground piping systems for natural gas, compressed air, low-conductivity water, cooling tower water, chilled water, hot water, fire protection water, sanitary sewer, and storm water that result in leaks and failures that impact operations and create the potential for environmental hazards will be corrected. Seismic upgrades to several buildings and structures that are necessary to provide for safety, protect the DOE's investment in valuable infrastructure, and allow the Laboratory to operate critical facilities shortly after a major earthquake are included.

Electrical Distribution Upgrade (SLI)

A rough cost estimate for this project is $14.7 million. Construction is planned for FY2008-FY2010.

This project will replace 13 Variable Voltage Substations which power the klystrons along the Klystron Gallery, many fixed-voltage substations and panel boards, and replacement of other miscellaneous electrical equipment. A more accurate cost estimate will be provided following engineering review.

Building Rehabilitation Project (Administrative & Engineering, Central Lab, Central Lab Addition) (SLI)

A rough cost estimate for this project is $13 million. Construction is planned for FY2012 – FY2015.

This project will rehabilitate and improve Building 041, Administration and Engineering ($4.2 million), Building 040, Central Laboratory ($5.7 million) and Building 084, Central Laboratory Addition ($3.1 million). Work includes interior painting, new floor coverings, new suspended ceilings, elevators and other ADA accommodations, energy efficient lighting, additional electrical panels and receptacles, and HVAC upgrades. A more accurate cost estimate will be provided following engineering review.

C. General Plant Projects

This section includes resource needs for GPP new construction, rehabilitation and improvement projects, and routine infrastructure projects.

1. New Construction

Building 131 Expansion (BES)

In order to accommodate all four new beam lines (two high brightness East Pit undulator beam lines, the 4-meter long straight, and a bending magnet) in the part of Building 131 that lies between the SPEAR trestle and beam line 6-2, Building 131 must be expanded by 3,500 square feet into the hillside with a retaining wall, electrical panels must be moved, and the stairway relocated.

Building 120 Expansion at Beam Line 7 (BES)

Offices and administrative support areas in Bldg 120 will be modernized, expanded by 2,000 square feet, and reconfigured to accommodate the anticipated additional staff required to support growth of user and research activities on SPEAR3.

Trailer Complex Replacement (BES)

A significant part of the SSRL staff is housed in modular buildings, which by 2015, will be well beyond their service life. A 6500 square foot single story building is proposed to replace the existing modular buildings in the same location.

Physics and Engineering Annex (HEP)

A 6,400 square foot two-story wood frame office building will be constructed adjacent to Physics and Engineering Building #280 to house staff and users including GLAST, Administration & Engineering Building overflow, BaBar and others currently located in seismically deficient trailers and modular buildings.

Radiological Calibration Facility (HEP)

A 1,000 square foot Radiological Calibration Facility (RCF) will replace the existing facility to meet radiation safety requirements. This facility will be a heavily-shielded enclosure to house and allow the safe and efficient usage of large-capacity gamma and neutron radiation sources for calibration of radiation detection instruments and material-irradiation-effects studies.

Cafeteria Upgrade (Landlord)

With the on-site Guest House, the proposed new site construction and the ever increasing user community, it is expected that the demands for improved on-site food service will increase. This upgrade will modernize the existing cafeteria and provide a 4,000 square foot addition which will improve the general layout and utility, and provide two dining rooms which can also be used as conference rooms.

2. Rehabilitation and Improvement Projects

SLAC's rehabilitation and improvement costs (RIC) for FY2005 – 2016 are estimated at $57.8 million. RIC is derived from a subset of GPP projects (other than new construction) and two SLI capital funded modernization projects. GPP funded RIC includes major building improvements, seismic upgrades, facility upgrades and other improvements totaling $29.2 million. The SLI capital funded RIC projects will rehabilitate underground mechanical utilities and improve operational reliability ($15.6 million) and rehabilitate and improve Buildings 40, 41 and 84 ($13 million). RIC projects are listed in Appendix VI, and funding sources are shown in Appendix IV.

3. Routine Infrastructure Projects

For purposes of the TYSP, routine infrastructure projects are defined as all GPP not included as new construction or RIC. These include many electrical and other utilities upgrades, telecommunications upgrades, ES&H upgrades and other projects. All routine infrastructure projects are listed in Appendix IV, Section 2.2.

D. Environmental Management

Appendix IV, Sections 4.2.3 and 4.2.4 shows funding expected from EM through FY2008. Sections 4.2.4 and 4.2.5 list estimated funding for projects and activities that are either not currently funded by EM or scheduled to be transferred from EM to SC in FY2009, pending agreement on a transfer plan. The funding for these environmental management projects is not included in the "level budgets" planning assumption.

E. Third Party Financed Projects

With the approval of DOE, third party financed projects will be constructed on the DOE leasehold. Budget year and cost estimates are provided in Appendix IV, Section 1.3.

KIPAC Building

Stanford University has received a $7.5 million donation from the Kavli Foundation to establish the Kavli Particle Astrophysics and Cosmology Institute (KIPAC). This money will provide a majority of the funding for a new 25,000 square foot two-story building located in the Central Campus across from the Main Gate. Stanford University will provide a loan of $3

million to cover the full construction costs of the building while additional gifts are being sought. The primary scientific mission of the Institute will focus on the mysteries of dark matter and dark energy. The building will include offices, conference rooms, and light laboratory space for 90 staff from SLAC and Stanford University. An auditorium seating 150 people is also included. Construction began in FY2005 with completion planned for FY2006.

Central Office Building

This 25,000 square foot multi-story office building is needed to provide housing for staff working on the International Linear Collider (ILC). Because the ILC program is expected to grow in the near future, the Laboratory proposes to build a new facility for the group rather than spend significant money to seismically upgrade their current accommodations of substandard trailers and modular buildings that are nearly 40 years old. Space will also be provided to accommodate staff in other programs that currently reside in deteriorated, seismically deficient trailers that were not intended to be used for more than a few years and are poorly suited to satisfy current needs. The building will provide modern office space in the Central Campus near the Central Laboratory, conveniently located near the shops and the entrance to the experimental areas. The estimated cost of this building, which is planned for FY2008, is $10 million.

Computer Building Annex

A 22,000 square foot multi-story annex on the west side of the existing Computer Building is planned for FY2009 to provide for the expected growth in computing for the SLAC science program. The existing computer building is already operating at the limit of available floor space and the continued expansion of capacity needed to serve the SLAC science program is being accommodated by acquiring increasingly densely packed equipment. A recent engineering study has confirmed that the building will reach the limits of power and cooling density before the end of the decade. At this time SLAC must be ready for a major expansion of computing to meet the expected needs of its programs in high-energy physics, particle astrophysics and cosmology, and new initiatives in data-intensive scientific computing. The size of the required building has been determined by an engineering study based on the expected computing needs early in the next decade, and will include approximately 16,000 square feet of raised floor for computer equipment. The estimated cost of this building is $12.5 million.

Bio-X

The Bio-X initiative on the Stanford University campus will bring together research scientists to work towards common goals in areas that cut across the biomedical, engineering and computational sciences. Structural biology is included in this framework, and one beam line at SPEAR is part of the core Bio-X program. A plan has been developed to create a Structural Molecular Biology Center at SSRL. A 32,000 square foot multi-story building will provide for the staff, faculty, students and visiting scientists with supporting infrastructure such as office, meeting, conference, training and laboratory space. It will house protein production facilities and computing equipment. The building will be sited north of SSRL's LOS Building near Central Campus. Based upon planned occupancy in FY2009, the estimated cost of this building is $23 million.

X-Ray Laboratory for Advanced Materials Science (XLAM)

This project will consist of a 20,000 square foot office, seminar and laboratory building located south of SSRL's LOS Building near Central Campus to house a group from SSRL and Stanford University that has created a strategic initiative focused on utilizing x-rays to characterize new materials and study their properties. The objective of this initiative is to enable forefront materials research by Stanford faculty and to make available newly developed techniques to the broader SSRL user community. The facility will serve faculty, post-doctorates and students. This project is planned for FY2011 and is estimated to cost $15 million.

SLAC Guest House, Phase 2

A 13,000 square foot addition will be needed if occupancy of SLAC's new 112 room Guest House increases. The project will consist of approximately 53 rooms and would be sited to utilize the common areas constructed for the initial facility, including the lobby, offices, meeting rooms, exercise facility and service areas. The estimated cost of this building is $7 million in FY2014.

Appendix I

Aerial View of SLAC

Appendix II

Summary Overview of SC Facilities at SLAC

Total Building Space (gross ft^2) (MARS Asset Type 501 – trailers not included)	1,723,494
Buildings (MARS Asset Type 501 - trailers not included)	112
Largest Occupied Building (gross ft^2)	61,414 ft^2 – Bldg. #040
Trailers, number of:	67
Real Property	39
Personal Property	28
Wooden Buildings (trailers not included)	8
Excess Facilities:	0
Uncontaminated	N/A
Contaminated	N/A
Excess Building Space Removed in FY04.	0
Replacement Plant Value (RPV): Total	$859,333,915
Programmatic (OSF 3000 category)	$2,917,294
Non-Programmatic (used for calculating Indices) (Note 1)	$850,577,026
Landlord Program	SC High Energy Physics
Age of Buildings: Average (MARS Asset Type 501 – trailers not included)	28 Years
% of space older than 40 years	5%
% of space 30 years or younger	52%
Maintenance Investment Index (Note 2)	
FY 05 (Note 3) (Note 4)	0.8%
FY 06 (Note 3)	1.0%

FY 07 (Note 3)	1.0%
FY 08 (Note 3)	1.0%
Deferred Maintenance (DM) Trend (Note 5)	
DM 2002	$12,736,235
DM 2003	$14,005,044
DM 2004	$23,336,053
DM 2005 (estimate) (Note 6)	$23,896,118
Total Summary Condition (DM + RIC) :	$81,111,053
Deferred Maintenance (DM 2004 estimate)	$23,336,053
Rehab and Improvement Cost (Note 7)	$57,775,000
Total Summary Condition Index (TSCI): (percent of Total RPV)	9.48%
Facility Condition Index (FCI) (based on DM)	2.69%
Rehab & Improvement Cost Index (RIC/RPV)	6.79%
ACI (Asset Condition Index from RPAM Order) (1-FCI)	0.97 (good)
AUI (Asset Utilization Index from RPAM Order)	1 (excellent)
Leased assets:	None
Square footage: Total	N/A
Office	N/A
Other	N/A
Annual Lease Costs:	N/A

Notes:

1. The asset "Site Prep Grading & Lands" with an RPV of $5,839,595 is not included in this figure as it is not used to calculate the indices.
2. SLAC's MII is less than SC's 2% goal, largely due to many high RPV, low maintenance facilities. SC recognizes this issue and intends to provide guidance that may result in a DOE waiver adjustment lowering SLAC's overall 2% goal.
3. The MII for FY2005 – FY2008 is based on 2.4% annual escalation for Operation and Maintenance, as provided in the FY2007 Field Budget Call guidance. It is also based on SLAC's proposed waiver for tunnels, unique experimental facilities and retaining walls (see Appendix IV).

4. Although $7.7 million is budgeted for maintenance in FY2005, the expected actual cost incurred, which is the basis for MII, is estimated to be about $6.5 million. It is expected that this $1.2 million carryover will be typical for the out-years, and therefore the proposed maintenance budget and the actual cost will be the about same from FY2006 forward.
5. See Section V.O., "Deferred Maintenance Reduction," for additional information.
6. The estimated DM for 2005 is based upon the current data in FIMS. The implementation of the "Maintenance Improvement Project" described in Section V.O. will provide data for improved estimating of future DM levels.
7. RIC is not yet recorded in FIMS.

Appendix III

Facilities and Infrastructure Condition Assessment

(Excel Spreadsheet)

Appendix IV

TYSP Summary of Resource Needs for Facilities and Infrastructure

(Excel Spreadsheet)

Appendix V

SLAC Proposed MII Waiver for Tunnels, Unique Experimental Facilities & Retaining Walls

Asset ID	Asset Name	FIMS GSF	FIMS RPV $
061	End Station A	27,880	21,286,380
062	End Station B	16,828	12,848,178
620	IR 2 Hall	9,324	3,489,030
640	IR 4 Hall	3,089	755,688
660	IR 6 Hall	9,375	2,293,484
680	IR 8 Hall	10,743	2,628,149
720	IR 12 Hall	7,713	1,886,895
750	Experimental Hall	46,751	11,437,083
002	Klystron Gallery	355,821	115,912,249
001	Accelerator Housing	115,461	87,136,474
009	Beam Switch Yard	70,175	53,578,612
010	Damping Ring Vault	4,068	3,105,918
011	Damping Ring Vault	5,460	4,168,710
600	Pep Ring Accel. Housing	85,656	56,678,575
748	Collider North Arc	47,972	36,626,622
749	Collider South Arc	51,490	39,312,615
132	Crane Shelter West Pit	4,620	5,884,679
140	SSRL Injector Shelter	9,750	1,985,100
	Subtotal Tunnels and Unique Experimental Facilities	884,176	461,014,440
811140252	Wall Retaining	2,100	301,882
811140259	Wall Retaining 8	4,472	463,363
811140260	Wall Retaining 15	864	172,374
811140261	Wall Retaining 14	2,196	338,650
811140262	Wall Retaining 13	74	255,509
811140263	Wall Retaining 12	965	338,650
811140264	Wall Retaining 11	1,996	255,509
811140265	Wall Retaining 10	1,386	227,797
811140266	Wall Retaining 9	2,510	671,212
811140268	Wall Retaining 7	2,625	560,360
811140269	Wall Retaining 6	5,986	352,511

811140270	Wall Retaining 5	259	338,,650
811140271	Wall Retaining 4	1,732	255,509
811140272	Wall Retaining 3	3,055	227,797
811140273	Wall Retaining 2	1,652	205,641
811140274	Wall Retaining 1	1,600	205,641
811140277	Wall Retaining Storage Ring	485	43,302
	Subtotal Retaining Walls	33,957	5,214,357
	WAIVER GRAND TOTALS	918,133	466,228,797

Appendix VI

Rehabilitation and Improvement Cost Projects (RIC)
(Excel Spreadsheet)

Appendix VII

Proposed FY 2005 Facilities Management Contract Performance Measures

Performance Area: FACILITIES MANAGEMENT

Cumulative Available Points: 25 points

Performance Area: PROJECTS & FACILITIES MANAGEMENT

Cumulative Available Points: 25 points

Projects and Facilities Management includes the effective and efficient management of the SLAC Infrastructure. The SLAC infrastructure (buildings, equipment, utilities, roads, and property) is required to be able to perform science at SLAC. Projects and Facilities Management involves the balancing of performing science at SLAC today while ensuring that science SLAC can be performed at SLAC in the future. Future science at SLAC is highly dependent on the SLAC maintenance program and new construction.

The following Performance Objective, Criteria and Measures evaluate the effectiveness of facilities management, while addressing the Balanced Scorecard.

Performance Period: Unless otherwise specified in the measures, the performance period is October 1, 2004 to September 30, 2005.

Performance Objective: #1 Physical Assets Planning, Real Property Management and Facility/Infrastructure Management

The Laboratory uses Physical Assets Planning, Real Property Management and Facility/Infrastructure Management to achieve excellence in managing SLAC facilities.
(Total Weight: 100%)

Performance Criterion: 1.1 Comprehensive Integrated Planning Process

The Laboratory will develop, document, and maintain a comprehensive, integrated plan that is aligned with DOE mission needs. Real property will be managed consistent with mission requirements and DOE direction.

Performance Measure 1.1.a Physical Assets Planning and Real Property Management
(Weight: 20%)

The intent is to measure the quality and timeliness of the planning process and products. Planning quality will be measured against integration of planning with program and operating budgets for the acquisition, utilization, maintenance,

recapitalization and disposition of real property, and documentation using a Ten Year Site Plan and related SLAC planning documents. Timeliness will be based on meeting SC deadlines and SLAC internal schedules.

SLAC will document its major planning activities (work plan) with associated milestones within the first month of the fiscal year, unless an alternate date is mutually agreed to with SSO. Milestones will include achieving SC's FY05 goals for the Asset Utilization Index and Asset Condition Index and accuracy and completeness of the Facilities Information Management System.

Performance Gradient:

The performance score will be determined by calculating the number of milestones completed as scheduled divided by the total number of milestones selected.

Target	Points
90% and above	5
80% but less than 90%	4
70% but less than 80%	3
60% but less than 70%	1
Less than 60%	0

Performance Criterion: 3.1 Facilities Management

The Laboratory will maintain capital assets to ensure reliable operations in a safe and cost-effective manner. Energy initiatives will be managed consistent with a comprehensive energy management plan.

Performance Measure: 3.1.a Facility and Infrastructure Maintenance and Energy Management
(Weight: 20%)

The intent is to measure the effectiveness of SLAC's facility maintenance and energy management programs. The Laboratory objective is to plan, budget and execute its programs in a manner which promotes operational safety, worker health, environmental compliance, property preservation, and cost effectiveness, while meeting program missions. Maintenance performance measures include: a Maintenance Investment Index (MII) final target of 2 percent in FY-06 for a defined set of conventional buildings/office trailers and negotiated percentages for subsets of unique buildings, such as accelerator tunnels; annual maintenance summary report; and Energy Management Plan. Specific MII objectives, maintenance plan milestones and energy management objectives will be established in partnership with SSO and made a matter of record at the beginning of the fiscal year.

Performance Gradient:

The performance score will be determined by calculating the number of milestones completed as scheduled divided by the total number of milestones selected.

Target	Points
90% and above	5
80% but less than 90%	4
70% but less than 80%	3
60% but less than 70%	1
Less than 60%	0

Performance Measure: 3.1.b Maintenance Management Index (Weight 20%)

SLAC will be measured against the successful achievement of the FY-05 Maintenance Investment Index goals established by the Office of Science for maintenance management. This goal involves achieving an MII of 1.7 for all conventional buildings at SLAC. Non-conventional buildings will not be assessed until the MII standard has been established for the non-conventional buildings (e.g. tunnels and large detector buildings).

Actual SLAC MII	Points
1.7 and above	7.5
1.6 up to 1.7	6.5
1.5 up to 1.6	5.5
1.4 up to 1.5	4.0
Less than 1.4	0